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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--------------------------|-------------|----------------------|---------------------|------------------|
| 10/596,436 | 06/13/2006 | Jun-Kyu Park | 20070-00003 | 6604 |
| 35736 | 7590 | 08/17/2009 | EXAMINER | |
| JHK LAW | | | ROY, SIKHA | |
| P.O. BOX 1078 | | | | |
| LA CANADA, CA 91012-1078 | | | ART UNIT | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/596,436 | Applicant(s) PARK ET AL. | |
| | Examiner Sikha Roy | Art Unit 2879 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/13/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The abstract of the disclosure is objected to because it is long. Correction is required. See MPEP § 608.01(b).

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50-150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claims 1 and 6 the limitation reciting '**second light being white light**' is not clear. The second phosphor dispersed in the transparent epoxy resin converts blue light into second light. The second phosphor being green, it is not clear whether the second phosphor is emitting green and then combination of red and green is making white or the second phosphor is emitting white light and thus renders the claims indefinite.

Proper clarification is required. For continuing examination 'the emitted light from LED' is considered white.

Claims 2-5 and 7-14 are rejected because of their dependency status from claims 1 and 6 respectively.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,2,4, 5, 6, 11,13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2004/0012027 to Keller et al., and further in view of US Pub 2004/0173807 to Tian et al.

Regarding claim 1 Keller discloses (Fig. 7 [0033], [0034], [0089], [0103]) a light emitting diode device comprising an LED chip mounting member 76 for mounting an LED chip, a blue LED chip 122 mounted on the mounting member, a first mold 132 (first protective layer) having transparent epoxy resin and a first phosphor 136 and sealing the blue LED, the first phosphor dispersed in the transparent epoxy resin to convert light emitted from blue LED into first light having first wavelength and a second mold 134 having transparent epoxy resin and a second phosphor 138 and formed on the first mold, the second phosphor dispersed in the transparent epoxy resin to convert light emitted from blue LED into second light having second wavelength. Keller discloses red, green types of phosphor.

Keller does not exemplify the second light (light emitted from the LED) being white light.

Tian in same field of endeavor discloses ([0047]) blue light emitted by the LED when combined with red and green light makes white light.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to select the two phosphors in the first and second molds of Keller as red and green emitting phosphors as disclosed by Tian so that the light emitted from the LED is white by combination of the emitted light and the first light from red phosphor and second light from green phosphor providing a white light emitting LED device.

Regarding claim 2 Keller as modified by Tian discloses the first phosphor converts the emitted light into red light and the second phosphor converts emitted light into green light.

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Regarding claim 4 Keller, discloses the claimed invention except for the limitation of thickness of the first mold being 10% to 92% of the combined thickness. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide thickness of the first mold, since optimization of workable ranges is considered within the skill of the art. Furthermore, the applicant has not established the critical nature of the thickness of the first mold being 10% to 90% of the combined thickness. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

Regarding claim 5 Keller discloses a bonding wire 128 for connecting the blue LED chip with an external connection terminal.

Claim 6 essentially recites the same limitations as of claim 1 for method of manufacturing a white LED device and hence is rejected for the same reason.

Claims 11,13 and 14 essentially recite the same limitations of claims 2,4 and 5 respectively and hence are rejected for the same reasons.

Claims 3, 10, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2004/0012027 to Keller et al., US Pub.2004/0173807 to Tian et al. and further in view of USPN 6,482,664 to Lee et al.

Regarding claims 3 and 12 Keller and Tian do not exemplify the first phosphor and the second phosphor account for 1% to 20% of the weight of their respective mixtures with the epoxy resin.

Lee in same field of endeavor of white light emitting diode discloses (col. 3 lines 25-39) content of fluorescent material in the mixture is 5 to 50% based on the weight of the molding compound . Lee teaches the brightness and wavelength of light emitted can be adjusted by adjusting the content of fluorescent material.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to specify the first and second phosphor content between 5 and 50% of the weight of the epoxy as suggested by Lee for providing desired brightness and wavelength of light emitted.

Regarding claim 10 Lee discloses (col. 3 lines 39-49) forming the mold is performed by transfer molding technique using transparent epoxy resin tablet mixed with phosphor. Lee teaches this method of manufacturing white LED is easy and inexpensive. It would be obvious to include the same transfer molding as suggested by Lee for the first and second phosphors of Keller and thus making a white LED in easy and inexpensive way.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2004/0012027 to Keller et al., US Pub. 2004/0173807 to Tian et al. and further in view of USPN 6,809,162 to Rubinsztajn and USPN 7,023,019 to Maeda et al.

Regarding claims 7-9 Keller and Tian do not exemplify the steps of forming the first mold and the second mold.

Rubinsztajn teaches (col. 4, lines 15-17, 30-35; col. 11, lines 25-65, see table 3) a method of encapsulating a solid state device featuring a cycloaliphatic epoxy resin, specifically, bisphenol-A epoxy resin (a main gradient) may be mixed with methylhexahydrophthalic anhydride (an acid anhydride/curing agent) at room temperature. A first cure and a second cure step are performed at 80 and 150°C, which is analogous to the semi and complete curing steps (necessarily at an ambient pressure), (see table 1, "processing"). The encapsulating material may include a phosphor to optimize color output (col. 12, line 66-col.13, line 10). Regarding the sequence of adding the ingredients (as per claims 7 and 9), Rubinsztajn discloses that the composition can be prepared by combining the various components in any convenient order (col. 9, lines 36-45). It is noted that the selection of any order of performing process steps is prima facie obviousness in the absence of new or unexpected results. In re Gibson, 39 F. 2d 975, 5 USPQ 230 (CCPA 1930). Furthermore, the materials may be cured in two stages wherein an initial thermal cure may be conducted to produce a partially hardened epoxy resin (e.g. a semi-cured epoxy resin) (col. 9, line65-col. 10, line 6). The composition may be applied as a potting compound/encapsulant for a LED device (e.g. feeding the obtained product into an

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element to be molded comprising a LED chip via a potting method as per claim 8).

Rubinsztajn does not expressly teach semi-curing the liquid epoxy resin under a specific reduced pressure.

Maeda teaches a method for fabricating a light-emitting semiconductor device such that the phosphor particles are distributed evenly throughout the resin (see abstract). Specifically, a phosphor containing suspension is first semi-cured under a reduced pressure in order to facilitate the removal of solvent (col. 63, lines 41-44). After semi-curing, the suspension is poured into a mold and undergoes final curing (col. 63, lines 45-58). It would have been obvious to one having ordinary skill in the art at the time of the invention to apply reduced pressure conditions as taught by Maeda in Rubinsztajn's method in order to provide a uniform semi-cured film without trapping air bubbles therein. Maeda does not expressly teach a specific reduced pressure, however, it is noted that this parameter is considered result effective. It would have been well within the level of ordinary skill in the art at the time of the invention to select the optimal pressure at a specified temperature in order to hasten the curing process. A lesser curing temperature would require a greater vacuum during the semi-cure process. While lacking a notification of criticality of a specific pressure, the discovery of optimum values of result effective variables in known processes would have been obvious to a person of ordinary skill in the art at the time of the invention in the absence of unexpected results. Consult *In re Boesch and Slaney* (205 USPQ 215 (CCPA 1980)). Rubinsztajn as modified by Maeda teaches this method of curing the main gradient with curing agent in two stages provides the benefit that it can be handled easily and then be further cured

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to produce a material with desired thermal performance, optical properties and moisture resistance for encapsulating solid state devices.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include the two stage method for making the first mold with first phosphor and then following the same steps for the second mold with second phosphor of Keller and Tian as suggested by Rubinsztajn and Maeda for providing the benefit that molds can be handled easily and then be further cured to produce a material with desired thermal performance, optical properties and moisture resistance for encapsulating solid state devices.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sikha Roy/
Primary Examiner, Art Unit 2879